Datex-Ohmeda
S/5™ Compact Anesthesia Monitor
S/5™ Compact Critical Care Monitor

Technical Reference Manual

All specifications are subject to change without notice.

CAUTION: U.S. Federal law restricts this device to sale by or on the order of a licensed medical practitioner. Outside the USA, check local laws for any restriction that may apply.

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S/5™ Compact Anesthesia Monitor

Intended use

The Datex-Ohmeda S/5 Compact Anesthesia Monitor with L-CANE03 or L-CANE03A software is intended for multiparameter patient monitoring with optional patient care documentation.

Indications for use

The S/5 Compact Anesthesia Monitor with L-CANE03 or L-CANE03A software is indicated for monitoring of hemodynamic (including arrhythmia and ST-segment analysis), respiratory, ventilatory, gastrointestinal/regional perfusion, Bispectral index (BIS), Entropy (State Entropy and Response Entropy) and neurophysiological status of all hospital patients.

The S/5 Compact Anesthesia Monitor with L-CANE03 and L-CANE03A software when using BIS is for monitoring the state of the brain by data acquisition and processing of electroencephalograph signals and may be used as an aid in monitoring the effects of certain anesthetic agents.

The S/5 Compact Anesthesia Monitor with L-CANE03 or L-CANE03A software is also indicated for documenting patient care related information.

The S/5 Compact Anesthesia Monitor with L-CANE03 or L-CANE03A software is indicated for use by qualified medical personnel only.

S/5™ Compact Critical Care Monitor

Intended use

The Datex-Ohmeda S/5 Compact Critical Care Monitor with L-CICU03 or L-CICU03A software is intended for multiparameter patient monitoring.

Indications for use

The S/5 Compact Critical Care Monitor with L-CICU03 and L-CICU03A software is indicated for monitoring of hemodynamic (including arrhythmia and ST-segment analysis), respiratory, ventilatory, gastrointestinal/regional perfusion, Bispectral index (BIS) and neurophysiological status of all hospital patients.

The S/5 Compact Critical Care Monitor with L-CICU03 and L-CICU03A software when using BIS is for monitoring the state of the brain by data acquisition and processing of electroencephalograph signals and may be used as an aid in monitoring the effects of certain anesthetic agents.

The S/5 Compact Critical Care Monitor with L-CICU03 and L-CICU03A software is indicated for use by qualified medical personnel only.

Classifications

In accordance with IEC 60601-1

CLASS I EQUIPMENT - the type of protection against electric shock.

TYPE BF or CF equipment. The degree of protection against electric shock is indicated by a symbol on each parameter module.

EQUIPMENT not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR OR WITH OXYGEN OR NITROUS OXIDE.

CONTINUOUS OPERATION according to the mode of operation.

In accordance with IEC 60529

Degree of protection against the harmful ingress of water as detailed in the IEC 60529: IPX1

In accordance with EU Medical Device Directive

The Datex-Ohmeda S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor are classified as IIb.

The Datex-Ohmeda S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor, is CE marked in accordance with the Medical Device Directive 93/42/EEC.

Responsibility of the manufacturer

Datex-Ohmeda Division, Instrumentarium Corp. is responsible for the effects on safety, reliability and performance of the equipment only if:

- assembly, extensions, readjustments, modifications, servicing and repairs are carried out by personnel authorized by Datex-Ohmeda.
- the electrical installation of the monitor room complies with appropriate requirements.
- the equipment is used in accordance with this manual.

Trademarks

Datex®, Ohmeda®, and other trademarks S/5, AS/3, CS/3, Entropy, D-lite, D-lite+, Pedi-lite, Pedi-lite+, Mini D-fend, D-fend, D-fend+, TruTrak®+, OxyTip+, MemCard, ComWheel, EarSat, FingerSat, FlexSat, PatientO2, Patient Spirometry and Tonometrics are property of Instrumentarium Corp. or its subsidiaries. All other product and company names are property of their respective owners.

Disposal

Dispose of the whole device, or parts of it, according to local environmental and waste disposal regulations.

Datex-Ohmeda

S/5™ Compact Anesthesia Monitor and Compact Critical Care Monitor

TECHNICAL REFERENCE MANUAL, M1019004

PART I, General Service Guide

Document No.	Updated	Updated	Description	
M1031508			Introduction, System description, Installation, Interfacing, Functional check, General troubleshooting	**1**
M1031510			Planned Maintenance Instructions	**2**

PART II, Product Service Guide

8005677-1			Display Unit for Compact Monitors F-CM1, F-CMC1 rev.00 ... 03; F-CMREC1, F-CMCREC1 rev 00 ... 01; Software Licenses, L-CANE03, L-CANE03A, L-CICU03, L-CICU03A	**1**
8005616-1			Frame Unit for Compact Monitors F-CM1, F-CMC1 rev. 00 ... 03; F-CMREC1, F-CMCREC1 rev. 00 ... 01; AC/DC Power Supply Unit	**2**

For the modules specific information see the Technical Reference Manual of the S/5™ Modules

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1 INTRODUCTION

The Datex-Ohmeda S/5 Compact Anesthesia Monitor is a modular multiparameter patient monitor. The monitor is especially designed for anesthesia monitoring.

The Datex-Ohmeda S/5 Compact Critical Care Monitor is also a modular multiparameter patient monitor. The monitor is especially designed for monitoring in intensive care units.

The modular design provides a flexible system that is easy to upgrade. In addition to parameter changes, the modularity includes an easy upgrade to anesthesia record keeping, monitor networking and interfacing with other external devices.

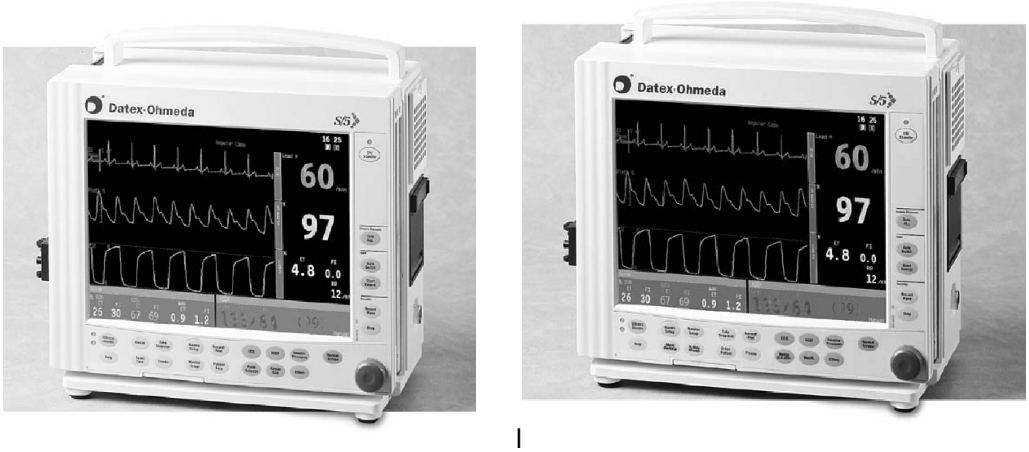


Figure 1 S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor

1.2 Notes to the reader

This Technical Reference Manual is intended for service personnel and engineers who will perform service and maintenance procedures on the Datex-Ohmeda S/5 Compact Anesthesia Monitor and the Datex-Ohmeda S/5 Compact Critical Care Monitor.

This Technical Reference Manual is divided into two parts in one folder:

- The order code for the entire printed manual is **M1019004**. This manual includes Technical Reference Manual Slots and every slot has an individual document number. M1031508 is the document number of this slot.
- Part I gives the reader an overview of the S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor and all monitor specific components. This part of the manual also contains the information needed to installing, interfacing and troubleshooting monitors. Instructions for service procedures; functional check and planned maintenance are also included. Read the manual through and make sure that you understand the procedures described before installation of the monitor. To avoid risks concerning safety or health, strictly observe the warning indications. If you need any assistance concerning the installation, please do not hesitate to contact your authorized distributor.
- Part II gives detailed descriptions of each component of the S/5 monitor e.g. frame unit, display unit and parameter modules. Service check for each product is included in these slots.

For information of other parameter modules, record keeping keyboard, Remote Controllers and Device Interfacing Solution see Technical Reference Manual S/5 Modules, order code **8005674**.

The manufacturer reserves the right to change product specifications without prior notice. Although the information in this manual is believed to be accurate and reliable, the manufacturer assumes no responsibility for its use.

Datex-Ohmeda assumes no responsibility for the use or reliability of its software in equipment that is not furnished by Datex-Ohmeda.

1.2.1 Related documentation

S/5 Compact Anesthesia Monitor

For more specific information about the clinical aspects and technical background refer to:
S/5 Compact Anesthesia Monitor, User's Guide
S/5 Compact Anesthesia Monitor, User's Reference Manual

S/5 Technical Reference Manual, S/5 Modules

For more specific information about other devices closely related to the S/5 Compact Anesthesia Monitor refer to:
S/5 Central, User's Reference Manual
Anesthesia Record Keeping Solution, User documentation

S/5 Compact Critical Care Monitor

For more specific information about the clinical aspects and technical background refer to:
S/5 Compact Critical Care Monitor, User's Guide
S/5 Compact Critical Care Monitor, User's Reference Manual

S/5 Technical Reference Manual, S/5 Modules

For more specific information about other devices closely related to the S/5 Compact Critical Care Monitor refer to:
Central, User's Reference Manual
CS/3 Arrhythmia Workstation, User's Reference Manual

1.2.2 Conventions used

Throughout this manual, the following conventions are used to distinguish procedures or elements of text:

Sign the check form after performing the procedure.

Hard Keys Hard key names on the Command Board, the Remote Controller, and modules are written in bold D-O Sans typeface, e.g. **ECG**.

Menu Items Menu items are written in bold italic, D-O Sans (11 pt) typeface, e.g. ***ECG Setup.***

'Messages' Messages displayed on the screen are enclosed in single quotes, e.g. 'Please wait'.

Chapters When referring to different chapters in the same manual, the chapter name is written in italic typeface and is enclosed in double quotes, e.g. chapter "*Cleaning and Care.*"

Other documents
When referring to different documents, the document name is written in italic typeface, e.g. refer to *User's Reference Manual*.

Hypertext links Hypertext links on PDF versions are written in blue color.

WARNING Warnings are written in bold typeface, for example:

WARNING **Use only hospital-grade grounded electrical outlets and power cord.**

CAUTION Cautions are written in the following way :

CAUTION The circuit boards contain sensitive integrated circuits that can be damaged by an electrostatic discharge. Careful handling of the boards is therefore essential.

1.3 Symbols

1.3.1 Symbols on transport packaging

The contents of the transport package are fragile and must be handled with care.

Indicates the correct upright position of the transport package.

The transport package must be kept in a dry environment.

Indicates the temperature limitations within which the transport package should be stored.

1.3.2 Symbols on equipment

Dangerous voltage.

When using the ARK Barcode Reader, N-SCAN, do not stare into beam. The N-SCAN Barcode Reader is a Class 2 laser product.

Attention, consult accompanying documents.

When displayed next to an O_2 value, indicates that the FiO_2 low alarm limit is set below 21 %.

When displayed next to an HR value, indicates that the pacer is set on R or a wide QRS is selected.

On the Interface Module, M-INT, indicates that the connection is for external devices and not for patient cables.

On the Tonometry Module, M-TONO, indicates that use only Tonometrics catheters.

On the BIS Module, M-BIS indicates that the converter must not be opened for any reason or autoclaved.

On the rear panel of the Compact Monitor Frame Unit, indicates the following warnings and cautions:

- Electric shock hazard. Do not open the cover or the back. Refer servicing to qualified personnel.
- For continued protection against fire hazard, replace the fuse only with one of the same type and rating.
- Disconnect the power supply before servicing.

Type BF (IEC-60601-1) protection against electric shock.

Type BF (IEC-60601-1) defibrillator-proof protection against electric shock.

Type CF (IEC-60601-1) protection against electric shock.

Type CF (IEC-60601-1) defibrillator-proof protection against electric shock.

When displayed on the upper left-hand corner of the screen, indicates that the alarms are silenced. When displayed on the menu or in digit fields, indicates that the alarm source has been turned off.

Other symbols

Equipotentiality. Monitor can be connected to potential equalization conductor.

Alternating current.

Fuse.

Battery operation and remaining capacity (green bar)

Battery charging

SN, S/N

Serial Number.

Sub menu. Selecting this symbol on a menu opens a new menu.

The monitor is connected to the Datex-Ohmeda S/5 Network.

The Monitor is connected to the Datex-Ohmeda S/5 Network (Wireless Local Area Network)

The Data card (green) and/or the Menu card (white) is inserted.

WLAN signal strength

Indicates beats are detected.

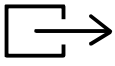
Respiration rate is measured using impedance respiration measurement.

In this manual indicates the procedure for making selections from the menus.

Ni-MH

This battery contains Ni-MH and can be recycled

Gas inlet



Gas outlet

Do not reuse

Do not immerse the sensor in liquids

1.4 Safety

1.4.1 Safety precautions

Warnings

WARNING **A WARNING indicates a situation in which the user or the patient may be in danger of injury or death.**

Power connection

- Before connecting the power cord to the mains outlet, check that the local voltage and frequency correspond with the rating stated on the device plate on the rear panel.
- Connect the monitor to a three-wire, grounded, hospital grade socket. Do not remove the grounding pin from the power plug.
- Use only an intact power cord. Replace the power cord if it is cracked, frayed, broken or otherwise damaged.
- Do not apply tension to the power cord otherwise the cord may get damaged.
- Do not use extension cords or adapters of any type.

Laser radiation

- When using the ARK Barcode Reader, N-SCAN, do not stare into beam. The N-SCAN is a Class 2 laser product.

External connection

- Do not connect any external devices to the monitor other than those specified by Datex-Ohmeda.

Fuse replacement

- Replace a fuse only with one of the same type and rating.

Explosion hazard

- Do not use the monitor in the presence of flammable anesthetics.

Patient safety

- Do not perform any testing or maintenance on the monitor while it is being used on a patient.
- Use only cables and accessories approved by Datex-Ohmeda. Do not modify them. Other cables and accessories may damage the monitor or interfere with the measurement.
- PACEMAKER PATIENTS: The impedance respiration measurement may cause rate changes in Minute Ventilation Rate Responsive Pacemakers. In this case set the pacemaker rate responsive mode off or turn the monitor impedance respiration measurement off.

Cleaning and service

- Only trained personnel with proper tools and test equipment should perform the tests and repairs described in this manual. Unauthorized service may void the monitor warranty.
- Turn the power off and unplug the power cord before cleaning or service. Completely remove any moisture before reconnecting the power cord to the mains outlet.
- Do not touch any exposed wire or conductive surface while any cover is removed and the monitor is energized. The voltages present can cause injury or death.
- NOTE! The monitor is always internally powered when the batteries are connected.
- Always perform an electrical safety check and a leakage current test on the monitor after service.

Cautions

CAUTION A CAUTION indicates a condition that may lead to equipment damage or malfunction.

Installation

- Leave space around the monitor to allow proper ventilation.
- Ensure that the module is properly orientated (i.e. module release latch facing downward) before insertion.

Before use

- Allow two minutes for warm-up and note any error messages or deviations from normal operation.
- Clean the fan dust filters once a month or whenever necessary.
- Do not connect a sampling line to the female Patient Spirometry connector while the other end of the sampling line is connected to the D-fend water trap. The pressure in the gas sampling system may cause damage to the PVX unit pressure transducer.

Autoclaving and sterilizing

- Do not autoclave any part of the monitor.
- Do not gas sterilize the modules.

Cleaning and service

- Do not use ammonia, phenol, or acetone based cleaners. These cleaners may damage the monitor surface.
- Do not immerse the monitor in any liquid. Do not allow liquid to enter the monitor or modules.
- Electrostatic discharge through the PC boards may damage the components. Before handling PC boards, wear a static control wrist strap. Handle all PC boards by their non-conductive edges and use anti-static containers when transporting them.
- Do not break or bypass the patient isolation barrier when testing PC boards.

Special components

- Special components are used in these monitors that are vital to assure reliability and safety. Datex-Ohmeda assumes no responsibility for damage, if replacement components not approved by Datex-Ohmeda are used.

- A lithium battery on the Central Processing Board. Dispose of the faulty IC containing the battery according to local regulations.

Batteries

The battery packages contain Ni-MH that is hazardous to the environment and therefore needs to be disposed of carefully according to local regulations.

To replace the batteries safely, please refer to the instructions in this manual.

- Do not short-circuit the battery terminals, this may produce a very high current, which will damage the battery.
- Do not dispose of the battery into open flame, nor put the battery near fire, as it may explode.
- Do not dismantle the battery. It contains electrolyte, which may damage clothing or cause injury to skin or eyes. If exposed to electrolyte, wash the injured area with plenty of clean water and contact a doctor.

See also section "*Symbols*".

Storage and transport

Do not store or transport the monitor outside the specified temperature and pressure ranges:

Temperature	-10...+50 °C/14...122 °F
Ambient pressure	660...1060 hPa/500...800 mmHg/660...1060 mbar
Humidity	10...90 % non-condensing

Disposal

Dispose of the whole device and parts of it in accordance with local environmental and waste regulations.

The manufacturer accepts no responsibility for any modifications made to the monitor outside its factory.

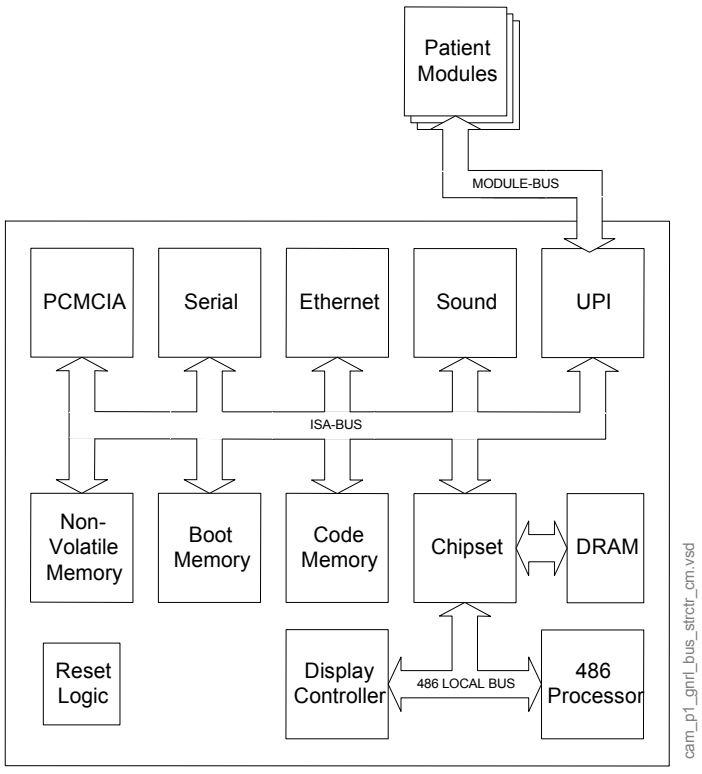
2 SYSTEM DESCRIPTION

2.1 Introduction

Datex-Ohmeda S/5 Compact Monitor builds up a freely configurable modular system. The architecture is designed to enable different module combinations so that the user is able to get the desirable parameter and feature set. This modular approach makes it possible to add new features when they are needed.

2.2 Bus structure

The operation of Datex-Ohmeda S/5 Compact Monitor is based on two communication channels, the CPU bus and module bus. All units, including the modules, receive power from the same power supply unit, which is an integral part of the monitor frame.



The CPU bus is a communication channel used only for internal data transfer. It is based on the ISA bus used in IBM PC computers. Data is transferred on this 16 bit wide bus using the CPU clock frequency.

The module bus is for the parameter modules. It bus is based on the widely used industry standard RS-485, which uses a differential serial method to transfer data. This type of bus is robust and it allows parameter modules to be inserted or removed while the power is on. The module bus uses a 500 kbps data transfer rate.

Figure 2 General bus structure of S/5 Compact Monitor

The RS-485 type of serial communication supports so-called multidrop or party line connections. This means that all parameter modules connected to the module bus use exactly the same lines for communication. The advantage of this is that all bus connectors are identical and the modules can be connected in any order and position.

2.3 Distributed processing

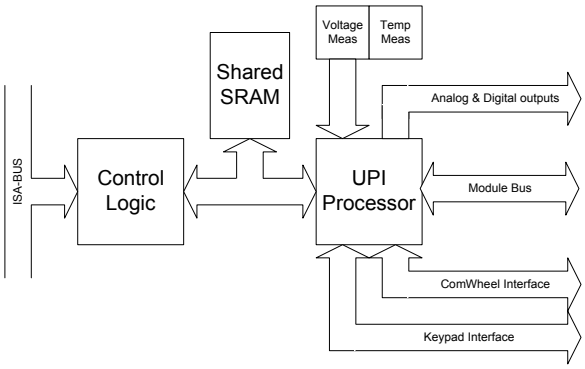
A system assembled from S/5 products is a multiprocessor system. All parameter modules have their own microprocessor, which performs low-level functions such as module key control, waveform filtering and pneumatic control, etc. At the same time the main CPU performs higher level tasks such as trending and alarm control. While the parameter modules and CPU are performing their tasks, the UPI (Universal Peripheral Interface) microprocessor handles all functions needed to transfer data between the parameter modules and the CPU. At the same time the Display controller microprocessor performs pixel calculations for graphics.

This kind of parallel processing gives one major advantage to centralized processing. When new parameter modules or boards are added to the system, the processing power is increased. As a result, the system does not slow down when new features are added.

2.4 Module communication

The communication master controlling data transfers between the CPU and parameter modules is called UPI microprocessor. The UPI microprocessor sends data to each connected module 100 times a second, or 10 times per second when the parameter module is not present. Modules respond to each data request immediately by sending a data package, which length depends on the type of the concerned module. This communication protocol ensures that each module receives and sends data every 10 ms. If a module does not respond to data requests, the UPI microprocessor presumes that the module is disconnected.

Each parameter module type has a fixed address, which the UPI microprocessor uses when sending out data. Therefore, two parameter modules of the same type must not be fitted onto the same monitor since they would reply to a data request simultaneously thus causing communication errors.



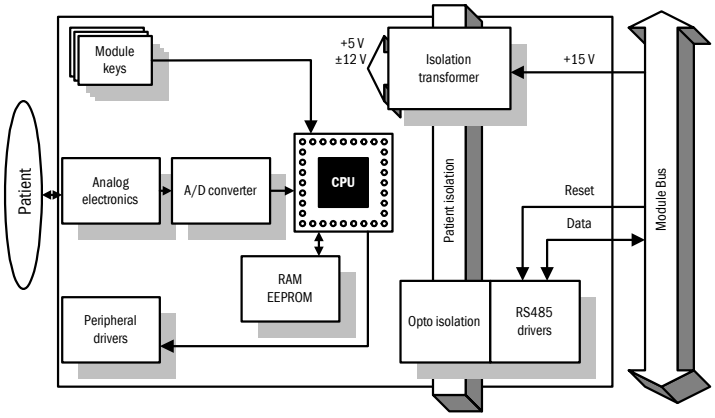
The UPI microprocessor collects and stores all data that is received from the parameter modules into a shared SRAM, which is mapped directly to the address space of the main CPU. The main CPU reads data from the memory while the UPI microprocessor guarantees that the data is up to date. This operation also works in the other direction. In this the main CPU fills the shared SRAM with data and the UPI microprocessor distributes it to the parameter modules.

Figure 3 Principle of UPI section operation

2.5 Software loading

The program memory on Central Processing Board is loaded with monitor software at the factory. The software is used for running all the functions that are integrated into the board. For service and upgrade procedures the Central Processing Board is fitted with a PCMCIA card drive through which new software can be loaded.

2.6 Parameter modules



The detailed structure of a parameter module depends on the specific needs for each individual parameter. However, some common parts are used in the parameter modules. The electronics inside the module is usually divided into isolated (floating) and non-isolated sections. Typically, the non-isolated section consists of buffers to interface the parameter module to the module bus while the rest of the electronics is located in the isolated section. The isolated section includes the microcontroller together with memory components, the front-end analog electronics (amplifiers, etc.) and peripheral drivers to control LEDs, sensors, valves and pumps.

Figure 4 General structure of parameter modules

3 SYSTEM INSTALLATION

3.1 Unpacking instructions

1. Confirm that the packing box is undamaged. If the box is damaged, contact the shipper.
2. Open the top of the box and carefully unpack all components.
3. Confirm that all components are undamaged. If any of the components is damaged, contact the shipper.
4. Confirm that all components are included. If any of the components is missing, contact your Datex-Ohmeda distributor.

3.2 Choosing location

Consider the following aspects:

- lighting
- space
- connections
- electromagnetic and radio frequency interference. For more information about the electromagnetic compatibility of S/5 Compact Monitor, see Appendix B.
- environment

3.3 S/5 Frame for Compact Monitor

Mounting of S/5 Compact Monitor to the Bed Mount, Wall Mount or Roll Stand is described in a separate instruction sheet delivered with each mount.

3.3.1 Compact Monitor connections

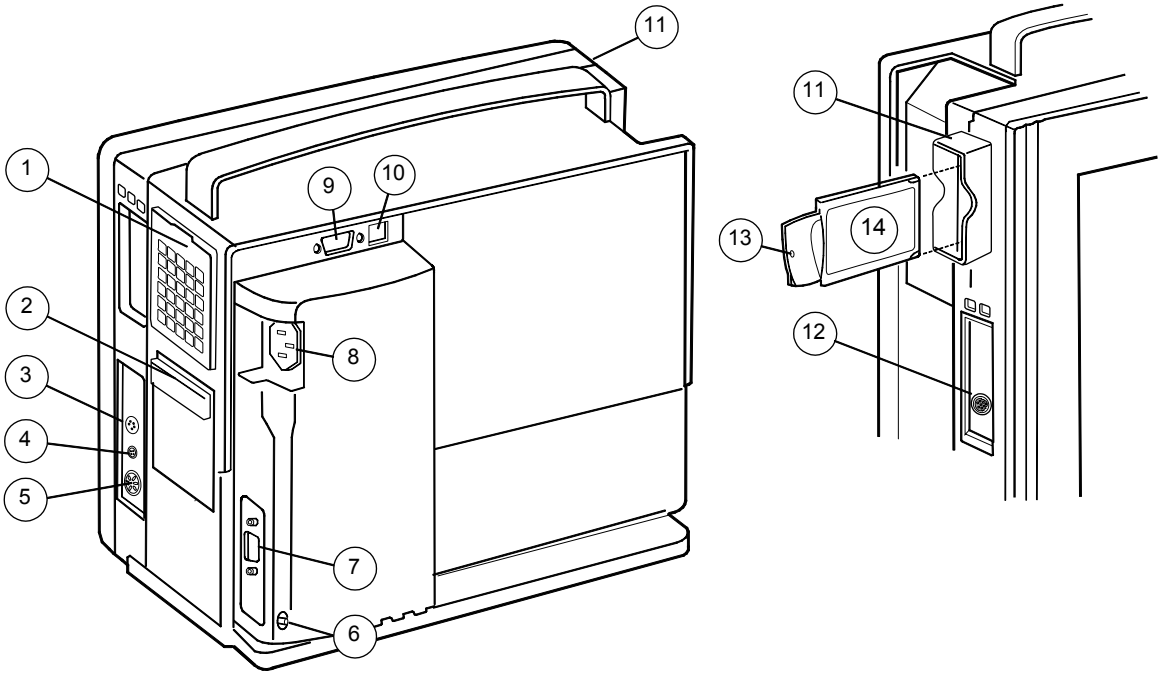


Figure 5 S/5 Compact Monitor connections

(1) Dust filters

(2) Recorder unit (optional)

(3) Connector for future options

(4) Synchronization connector

(5) K-CREMCO, K-ARKB and N-SCAN connector

(6) Potential equalization connector

(7) Serial port connector

(8) Receptacle for power cord

(9) NET ID connector

(10) NET connector

(11) WLAN antenna cover (optional)

(12) Connector for Device Interface Solution

(13) WLAN antenna card LED

(14) WLAN antenna card (optional)

CAUTION Switch the power to standby before making any connections.

3.3.2 Connection to mains

Connect the power cord to the mains power inlet on the side of the power supply unit and to the wall socket.

NOTE: Before taking the monitor into use for the first time, the batteries should be fully charged. Keep the monitor connected to the mains until the Battery charging symbol disappears, or in STBY mode the Stby LED stops blinking (may take up to 10 hours if the batteries are fully discharged).

WARNING **The power cord may only be connected to a three-wire, grounded, hospital grade receptacle.**

3.3.3 Connection to Network

Make sure that the S/5 Network Option, N-CMNET or S/5 MemCard and Network Option, N-CMMEM is installed.

Note! With L-CANE03(A) and L-CICU03(A) softwares, the N-CMNET option is automatically installed.

Use the Monitor-Network cable to connect the monitor to the network.

1. Make sure that the power is switched off.
2. Connect the Identification Plug and one RJ-45 connector to the connectors X4 and X5 at rear of the monitor.
3. Connect the other RJ-45 connector to the corresponding connector on the wallbox.
4. Switch on the power. Confirm that the network symbol and 'Connected to Network' message are displayed on the upper part of the screen.

3.3.4 Connection to Wireless Network

Make sure that the S/5 Wireless LAN Option, N-CMW and the antenna cover are installed.
Use the wireless LAN antenna card to connect the monitor to the network.

Note! The N-CMW option requires also, that either N-CMNET or N-CMMEM option is installed.

1. Make sure that the power is switched off.
2. Connect the wireless LAN antenna card into the foremost card drive slot.
3. Switch on the power. Confirm that the wireless LAN network symbol and the wireless LAN signal strength symbol are displayed on the upper part of the screen.

3.3.5 Inserting the parameter modules

Insert each plug-in parameter module into a module slot. Firmly press the module in position.

NOTE: Do not use two or more modules with identical functions in the monitor.

Modules with identical functions are:

- Hemodynamic multiparameter modules: M-ESTPR, M-ETPR, M-ESTR, M-NESTPR, M-NETPR, M-NESTR, M-NE12STPR, M-NE12TPR and M-NE12STR
- Pressure Modules: M-P, Pressure Temp Module, M-PT
- Cardiac Output Modules: M-COP and M-COPSv
- NIBP Modules: M-NIBP, M-NESTPR, M-NETPR, M-NESTR, M-NE12STPR, M-NE12TPR and M-NE12STR
- Compact Airway Modules: M-C, M-CO, M-COV, M-CAiOV, M-CAiO, M-CAiOVX and M-miniC
- The Recorder Module, M-REC and the built-in recorders in F-CMREC1 or F-CMCREC1 and U-CMREC1 or N-CMREC1.

3.3.6 Downloading Monitor Software

The following instructions apply to downloading of new monitor software in case of upgrade or service. Detailed instructions for downloading software are supplied with software PCMCIA cards.

NOTE: All user settings will be lost after downloading of new monitor software.

NOTE: During the downloading of software the serial number of the monitor is written on the software card. The software can then be downloaded again onto the same monitor, but not onto any other monitor.

1. Make sure that the monitor is switched to standby. Press and hold the service reset button on the rear panel for at least five seconds or until the service reset indicator LED turns off.
2. Open the cover for card drive slots, if installed. Insert the software card into one of the card drive slots and press the software card firmly in position.
3. Make sure that at least 30 seconds have passed since the service reset then switch the monitor on.
4. Wait for approximately 80 seconds. After the start up screen appears enter the Service View and make sure that the information regarding monitor software has been updated. Memorize the serial number of new software.
5. Remove the software card.
6. Replace the original device plate for monitor software by the new one supplied with the software card.
7. Perform Factory Reset. Make sure that the monitor functions normally after the restart.
8. Set the time and date.
9. Set the monitor's network communication according to the used network software, if necessary. Enter the service menu: **Monitor Setup** –***Install/Service (16-4-34) - Service (26-23-8)– Frame – Network- Config*** and set
    - Network software S-CNET99 -> DRI Level = 1999
    - Network software S-CNET01 -> DRI Level = 2001
    - Network software S-CNET02 -> DRI Level = 2001 or 2002 (WLAN)
    - Network software L-NET03 -> DRI Level = 2003

NOTE: In L-CANE03(A) and L-CICU03(A) or newer softwares it is not possible to select DRI Level

1999.

NOTE: If the DRI level is changed, the monitor will restart automatically.

10. Fill out all necessary documentation regarding the new monitor software.

NOTE: The license agreement of monitor software needs to be in accordance with the monitor software serial number. Make sure you archive the license agreement in a secure location.

NOTE: The first start-up after software loading takes considerably longer.

3.3.7 Installing the S/5 Network and MemCard Upgrade, U-CMMEM

The following instructions apply to upgrading the monitor with both, the MemCard and Network options. Detailed upgrade instructions are supplied with the corresponding upgrade product.

NOTE: You can download the option software only onto one monitor. During the downloading of option software the serial number of the monitor is written on the software card, and if the downloading for some reason would fail, the software can be downloaded again onto the same monitor, but not onto any other monitor.

1. Make sure that the monitor is switched to standby.
2. Detach the cover plate on the network connectors at the rear of the frame unit (above the power supply unit). Leave the collar on the connectors attached.
3. Open the cover for card drive slots (on the left side of the monitor). Insert the option software card into one of the card drive slots and press the software card firmly in position.
4. Switch the monitor on.
5. Wait until the normal screen appears and check that a message 'Field upgrade OK' is displayed as a note of successful upgrade.
6. Remove the option software card.
7. Enter the service menu and make sure that both options were loaded (**Monitor Setup** – ***Install/Service - Service – Frame – Options - "Net+DC"***)
8. Install the device plate for option software on inside the cover for card drive slots. Close the cover.
9. Test the monitor with a MemCard and by connecting it onto S/5 Network.
10. Fill out all necessary documentation regarding the upgrade.

3.3.8 Installing the S/5 Network Upgrade, U-CMNET

The following instructions apply to upgrading the monitor with the Network option. Detailed upgrade instructions are supplied with the corresponding upgrade product.

NOTE: You can download the option software only onto one monitor. During the downloading of option software the serial number of the monitor is written on the software card, and if the downloading for some reason would fail, the software can be downloaded again onto the same monitor, but not onto any other monitor.

1. Make sure that the monitor is switched to standby.
2. Detach the cover plate on the network connectors at the rear of the frame unit (above the power supply unit). Leave the collar on the connectors attached.
3. Open the cover for card drive slots (on the left side of the monitor). Insert the option software card into one of the card drive slots and press the software card firmly in position.
4. Switch the monitor on.

5. Wait until the normal screen appears and check that a message 'Field Upgrade OK' is displayed as a note of successful upgrade.
6. Remove the option software card.
7. Enter the service menu and make sure that the option was loaded (**Monitor Setup** – ***Install/Service - Service – Frame – Options - "Net"***)
8. Install the device plate for option software on inside the cover for card drive slots. Close the cover.
9. Test the monitor by connecting it onto S/5 Network.
10. Fill out all necessary documentation regarding the upgrade.

3.3.9 Installing the S/5 Wireless LAN Upgrade, U-CMW

The following instructions apply to upgrading the monitor with the Wireless LAN option. Detailed upgrade instructions are supplied with the corresponding upgrade product.

NOTE: You can download the option software only onto one monitor. During the downloading of option software the serial number of the monitor is written on the software card, and if the downloading for some reason would fail, the software can be downloaded again onto the same monitor, but not onto any other monitor.

1. Make sure that the monitor is switched to standby.
2. Open the cover for card drive slots (on the left side of the monitor). Insert the option software card into one of the card drive slots and press the software card firmly in position.
3. Switch the monitor on.
4. Wait until the normal screen appears and check that a message 'Field Upgrade OK' is displayed as a note of successful upgrade.
5. Remove the option software card.
6. Switch the monitor to standby.
7. Detach the cover for card drive slots and install the antenna cover.
8. Insert the wireless LAN antenna card into the foremost card drive slot.
9. Switch the monitor on.
10. Enter the service menu and make sure that the option was downloaded successfully (**Monitor Setup - *Install/Service - Service - Frame - Options - "WLAN" or "All"***)
11. Enter the WLAN service menu and enter appropriate Network ID, WEP Algorithm, Key ID and Encryption Key information (**Monitor Setup - *Install/Service - Service - Frame - Network - WLAN - WLAN Config***)
12. Check all installed options on the monitor software device plate and attach the Virtual ID sticker under the device plate at the monitor rear panel.
13. Test the monitor on S/5 Network.
14. Fill out all necessary documentation regarding the upgrade.

3.3.10 Installing the S/5 Recorder Upgrade, U-CMREC1

NOTE! Only S/5 Compact Anesthesia Monitor rev 02 or later and S/5 Compact Critical Care Monitor rev. 02 or later can be upgraded with this S/5 Recorder Upgrade kit.

1. Turn the monitor off.
2. Disconnect the power cord.
3. Push “Service Reset” -button for at least 5 seconds until the service reset indicator LED turns off (the fan should turn off).
4. Remove the plate that covers the recorder installation place in the side panel.
5. Open the recorder (by pressing the button on the right upper corner in the front of the recorder).
6. Insert the recorder from outside to the side panel (opening button upwards).
7. Attach the recorder to the side panel with two screws at the back of the recorder (the screws can be accessed inside the the recorder).
8. Check that the recorder and the side panel are aligned and recorder tightly attached.

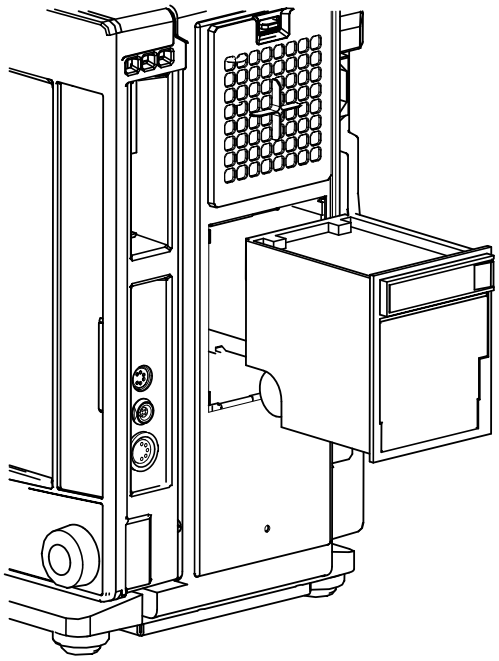


Figure 6 Installation of the U-CMREC1

9. Attach the device plate to the back cover of the monitor, near the other device plates.

3.3.11 Performing Factory Reset

NOTE: The factory reset is necessary after replacing monitor software.

NOTE: The factory reset will restore all customized defaults, including language selection, to factory defaults.

1. Press the **Monitor Setup** key.
2. Select ***Install/Service*** and password (16-4-34).
3. Select ***Service*** and password (26-23-8).
4. Select ***Set/ Test*** and ***Factory Reset***.
5. The monitor will perform an automatic restart. After the restart is completed, restart the monitor also manually.

3.4 S/5 Remote Controller, K-CREMCO

To connect S/5 Remote Controller, K-CREMCO to a S/5 Compact Monitor:

1. Make sure that the monitor is switched to standby.
2. Connect the K-CREMCO to the 5-pin DIN connector X9 that is located on the right side of the Compact Monitor display unit.

3.5 Anesthesia Record Keeping Keyboard, K-ARKB

To connect Anesthesia Record Keeping Keyboard, K-ARKB to a S/5 Compact Monitor:

1. Make sure that the monitor is switched to standby.
2. Connect the K-ARKB with an appropriate cable to the 5-pin DIN connector X9 that is located on the right side of the Compact Monitor display unit.

3.6 ARK Barcode Reader, N-SCAN (optional)

3.6.1 Connection to Compact Monitor

1. Make sure that the monitor is switched to standby.
2. Connect the N-SCAN with an appropriate cable to the 5-pin DIN connector X9 that is located on the right side of the Compact Monitor display unit.

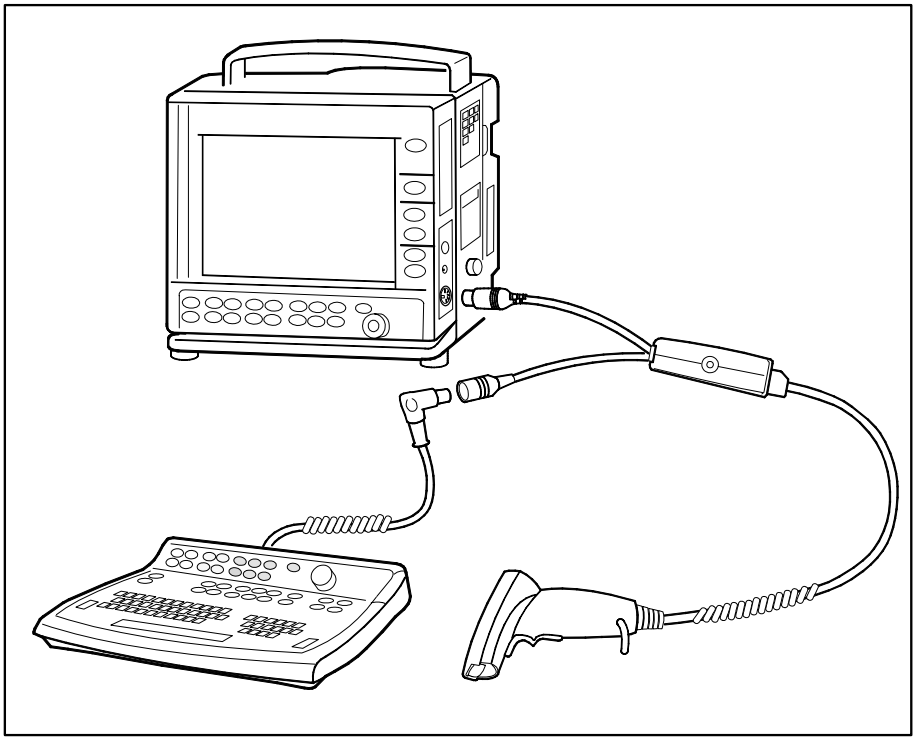


Figure 7 ARK Barcode Reader, N-SCAN connected to Compact Monitor

3.7 Compact Airway Modules, M-xxxxxx

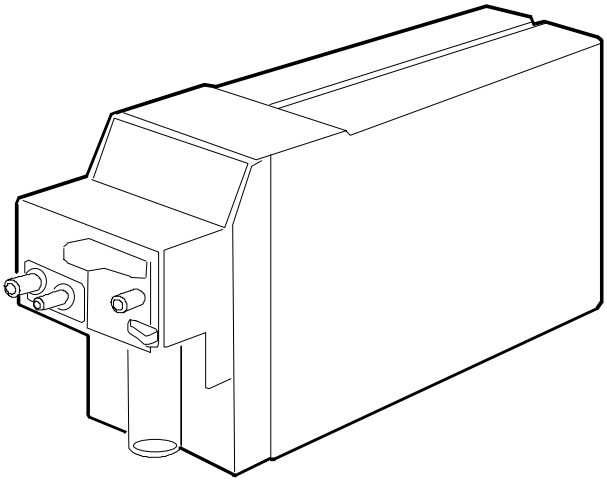


Figure 8 Datex-Ohmeda Compact Airway Module

Compact Airway Modules (M-series) are installed as any plug-in modules.

3.7.1 Sample gas exhaust

When N_2O and/or volatile anesthetics are used, pollution of the operating room by these gases should be prevented. Connect the sample gas outlet of the Compact Airway Module (at the front panel) to the scavenging system according to one of the following procedures.

1. Connect an exhaust line to the sample gas outlet and to the ventilator reservoir. The reservoir tube diameter must be at least 2-3 times larger than the exhaust line.

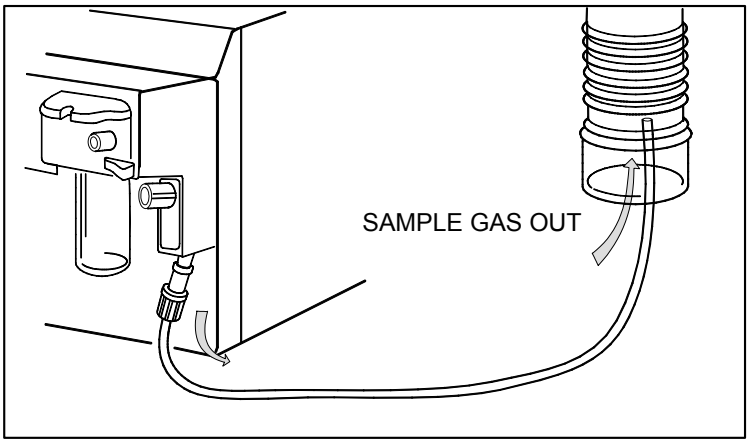


Figure 9 Exhaust to reservoir tube

2. Connect an exhaust line to the sample gas outlet and to a scavenging tube. Use a T-fitting between the module and the exhaust line.

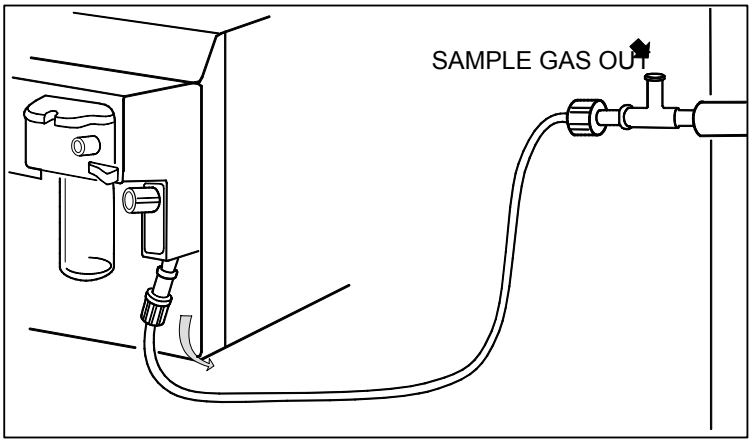


Figure 10 Exhaust to scavenging tube

CAUTION Make sure that the sample gas is not removed from the Compact Airway Module under a strong suction. To prevent this, there must always be an opening to room air. A strong suction may change the operating pressure of the Compact Airway Module and cause inaccurate readings or internal damage.

3.7.2 Returning sample gas to patient circuit

Take special care when returning sample gas to the patient circuit. For further information, please refer to the “User’s Guide” and/ or contact your Datex-Ohmeda distributor.

3.8 Troubleshooting

If a problem occurs during the functional examination, check the components of the monitor according to the following troubleshooting chart. If the problem persists, please refer to the Part II.

TROUBLE	TREATMENT
Nothing functions	Unplug and re-plug Remote Controller Cable. Also confirm that the cable is intact. Unplug and re-plug the Power Cord. Also confirm that the cable is intact. Confirm that the fuses are intact.
A plug-in module does not function	Remove and replace the module. Confirm that the desired parameters are configured to be displayed.
Compact Airway Module does not function	Confirm that “Occlusion” or “Calibrating Gas Sensor” messages are not displayed. Confirm that a D-fend water trap and a sample tube are attached. Confirm that the desired parameters are configured to be displayed. Remove and replace the module.

4 INTERFACING

External devices can be interfaced with the S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor via the Compact Monitor's serial port, via the S/5 Interface Module, M-INT and via the Device Interfacing Solution, N-DISxxx.

The serial port can be used for interface with:

- S/5 Anesthesia Delivery Unit
- Printers
- Computers

The Interface Module, M-INT can be used for interface with:

- Datex-Ohmeda monitors
- Various other manufacturers' monitors
- Various anesthesia machines

Device specific N-DISxxx modules can be used with:

- Ventilators/ anesthesia machines
- Monitors
- Heart-lung machines
- Blood-gas analyzers

4.1 Interfacing external monitors via the Interface Module, M-INT

It is possible to interface Datex-Ohmeda monitors, Critikon Dinamap 1846SX, Abbott Oximetrix 3, Baxter Explorer and Vigilance, Nellcor N-100, N-200 and N-1000 with the S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor via the Interface Module, M-INT. The parameters transferred are summarized in tables 1 and 2.

The Interface Module, M-INT has two serial/analog connectors (X7 and X8).

WARNING **Always make sure that the combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.**

Table 1 Transference of parameters, Datex-Ohmeda monitors

Device	Waveforms (analog)	Numerics	Alarms
Cardiocap	M-INT -> CO_2	Et&Fi Airway gases, Respiration rate, SpO_2, Pulse rate	None
Capnomac Capnomac II	M-INT -> CO_2, Pleth	Et&Fi Airway gases, Respiration rate.	None
Capnomac Ultima	M-INT -> CO_2	Et&Fi Airway gases, Respiration rate, Spirometry,SpO_2, Pulse rate, Pleth amplitude	CO_2, O_2, Anesthesia agent, respiration rate, Apnea, occlusion, SpO_2, pulse rate.
Normocap 200 Normocap 200 OXY	M-INT -> CO_2	Et&Fi Airway gases, Respiration rate.	None
Oscar Oscar II Oscar OXY	M-INT -> CO_2, Pleth	Et&Fi Airway gases, Respiration rate, SpO_2, Pulse rate, Pleth amplitude	None
Satlite Satlite II Satlite Plus	M-INT -> CO_2	SpO_2, Pulse rate, Pleth amplitude	None
Satlite Trans	None	SpO_2, Pulse rate, Pleth amplitude	None

Table 2 Transference of parameters, external monitors

Device	Waveforms	Numerics	Alarms
Critikon Dinamap 1846SX	None	NIBP	None
Abbott Oximetrix 3	None	SvO_2/SaO_2, CO	None
Baxter Explorer	None	C.O., SvO_2, REF, Tblood	None
Baxter Vigilance	None	C.O., SvO_2,C.C.O., Tblood	None
Nellcor N-100 N-200 N-1000	Pleth (analog)	SpO_2, Pulse rate	None

4.1.1 Connection to external Datex-Ohmeda monitors

Use the INT-External Device Cable.

1. Make sure that the power on both monitors is switched off.
2. Connect the 9 pin D-connector to one of the connectors on the Interface Module, M-INT. Tighten the finger screws.
3. Connect the 25 pin D-connector to the corresponding connector on the interfaced monitor. Tighten the finger screws.

4.1.2 Connection to Critikon Dinamap 1846SX, Abbott Oximetrix 3 and Baxter Explorer

Use the INT-External Device Cable.

1. Make sure that the power on both monitors is switched off.
2. Connect the 9 pin D-connector to one of the connectors on the Interface Module, M-INT. Tighten the finger screws.
3. Connect the 25 pin D-connector to the corresponding connector on the interfaced monitor. Tighten the finger screws.

4.1.3 Connection to Baxter Vigilance

Use the INT-Baxter Vigilance Cable.

1. Make sure that the power on both monitors is switched off.
2. Connect the 9 pin D-connector to one of the connectors on the Interface Module, M-INT. Tighten the finger screws.
3. Connect the other 9 pin D-connector to the connector X3, X7, X8 or X9 on the interfaced monitor. Tighten the finger screws.

Communication parameters: Baud rate 19200, no parity (none), data bits 8, stop bits 1.
Mode of communication port: IFM out.

4.1.4 Connection to Nellcor N-100 and N-1000

Use the Monitor-Nellcor Cable.

1. Make sure that the power on both monitors is switched off.
2. Connect the 9 pin D-connector to one of the connectors on the Interface Module, M-INT. Tighten the finger screws.
3. Connect the mono connectors to the corresponding connectors on the interfaced monitor.

4.1.5 Connection to Nellcor N-200

Use the Monitor-Nellcor Cable.

1. Make sure that the power on both monitors is switched off.
2. Connect one of the connectors to the corresponding connector on the Interface Module, M-INT. Tighten the finger screws.
3. Connect the other connector to the corresponding connector on the interfaced monitor. Tighten the finger screws.
4. Connect the mono connectors to the corresponding connectors on the interfaced monitor.

4.1.6 Setting S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor interfacing parameters

1. Press the **Monitor Setup** key.
2. Select ***Install/Service*** (password 16-4-34).
3. Select ***Installation Interfacing - More...***
4. Combine a required parameter with the interfaced device. The selection will be automatically stored in permanent memory.
5. Press the **Normal Screen** key.

4.2 Interfacing external bedside devices via S/5 Device Interfacing Solutions, N-DISxxx

The Device Interfacing Solution,N-DISxxx, provides means for transferring physiological, waveform and event data from various bedside patient care devices to the Datex-Ohmeda monitoring system. The real-time and trended data can be displayed on the monitor screen and used for record keeping purposes. The interfacing module reads the data coming from the external device converts it to a suitable format and sends it to the monitor. With the Device Interfacing Solution, N-DISxxx you can interface up to ten different devices simultaneously.

See the following lists and tables of devices that you can interface with the Device Interfacing Solution.

4.2.1 Interfaced devices and parameters

Ventilator interfaces

Device	Device set values for trends	Measured numeric values	Waveforms	
Datex-Ohmeda SmartVent 7900	Vent. mode, I:E ratio, RR, TV, PEEP, Pinsp, InspPause	FiO_2, TVexp, MV, RR, Pmean, Ppeak, Pplat	Paw, Flow, Vol	N-DIS7900
Datex-Ohmeda Aestiva /5 Aestiva /5 7100 Aestiva /5 Compact	Vent. mode, I:E ratio, RR, TV, PEEP, Pinsp, InspPause	FiO2, TVexp, MV, RR, Pmean, Ppeak, Pplat	Paw, Flow, Vol	N-DISAEST
Dräger Evita 4	FiO_2, Vent. mode, I:E ratio, RR, TV, PEEP, Pinsp	FiO2, $EtCO_2$, TVexp, MV, MVspont, RR, Ppeak, Pplat, Pmean, Raw, Compl, PEEPi	Paw, Flow, Vol	N-DISEV
Nellcor Puritan Bennett 7200	Vent. mode, RR, TV, PEEP, O_2 setting	expTV, expMV, expMVspont, RR, Ppeak, Pplat, Pmean, Dyn. Raw, Dyn. Compl, I:E ratio		N-DIS7200
Nellcor Puritan Bennett 840	Vent. mode, I:E ratio, RR, TV, PEEP, O_2 setting.	expTV, expMV, expMVspont, RR, Ppeak, Pplat, Pmean, I:E ratio		N-DIS840
Siemens Servo 300	CMV freq set, SIMV freq set, Insp. Time, Pause time, MV, PEEP, Pinsp, Plimit, Vent mode, O_2 concentr	O_2 insp, TV exp, TV insp, MV exp, MV insp, RR, Ppeak, Pplat, Pmean, PEEP, PAmbient	Paw, Flow, Vol	N-DISS300
Dräger Primus	FiO2, vent.mode, I:E ratio, RR, TV, PEEP, Pinsp	FiO2, EtCO2, TVexp, MV, MVspont, RR, Pmean, Ppeak, Pplat, Raw, Compl, PEEPi	Paw, Flow, Vol	N-DISPRIM

Monitor interfaces

Device	Numeric values	
Abbott Qvue/Q2	CO, CCO, Tblood, and SvO_2 (Q2 only)	N-DISQVUE
Abbott Oximetrix 3	CO, SvO_2	N-DISOXIM3
Aspect A-2000 BIS Monitor	BIS, SQI, EMG	N-DISA2000
Baxter Vigilance	CO, CCO, SvO_2, TBLOOD	N-DISVIGIL
Datex-Ohmeda RGM	CO_2, O_2, N_2O, AA, RR, SpO_2, HR, Paw, TV, MV	N-DISRGM
Datex-Ohmeda Tonocap	$PgCO_2$	N-DISTONO
Datex-Ohmeda Capnomac, Capnomac II,	$EtCO_2$, $FiCO_2$, EtO_2, FiO_2, EtN_2O, FiN_2O, EtAA, FiAA, AA selection, RR, PAmbient	N-DISWHITE
Satlite, Satlite trans and Satlite Plus	Pulse, SpO_2	
Oscar II, Oscar oxy, Cardiocap 1GS and Cardiocap 2GS	$EtCO_2$, $FiCO_2$, EtO_2, FiO_2, EtN_2O, FiN_2O, RR, Pulse, SpO_2%	
Capnomac Ultima	$EtCO_2$, $FiCO_2$, EtO_2, FiO_2, EtN_2O, FiN_2O, EtAA, FiAA, AA selection, RR, PAmbient, Auto id AA, Pulse, SpO_2%, MV exp, MV insp, TV exp, TV insp, Compl, Ppeak, Pplat, PEEP, I:E	
Normocap CD-200	$EtCO_2$, $FiCO_2$, EtN_2O, FiN_2O, RR, PAmbient	
Multicap, Normocap CD2-02,	$EtCO_2$, $FiCO_2$, EtO_2, FiO_2, EtN_2O, FiN_2O, RR, PAmbient	

Heart-lung machines

Device	Device set values for trends	Measured numeric values in trends	
Jostra HL20	bypass on, bypass off, aorta closed, aorta open	speed, flow rate, systolic pressure, diastolic pressure, mean arterial pressure, FiO_2, $FiCO_2$, cardioplegia amount	N-DISHL20

Bloodgas analyzers

Device	Numeric values	
AVL Opti CCA	pH, PCO_2, PO_2, ctHb, SO_2, barometric pressure, HCO_3, BE, Temp, Kalium (Potassium), Natrium (Sodium), O_2Ct	N-DISOPT

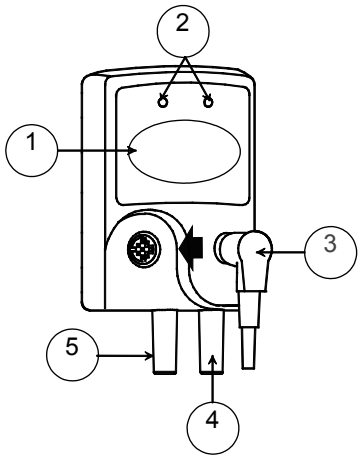
4.2.2 Device Interfacing Solution components

The Device Interfacing Solution consists of:

- a device specific interfacing module
- a device specific cable
- a bus cable
- a connector for another bus cable
- label specifying the external device

4.2.3 Connections

Connect the device specific cable to the external device and the bus cable to the monitor's DIS connector, or to another interfacing module.



(1) label specifying the external device

(2) LED indicators

(3) black bus cable from another interfacing module, if needed

(4) grey device specific cable to the communication port of the external device

(5) black bus cable to the monitor's DIS connector, (or to another interfacing module)

Figure 11 Connection cables and LED indicators

WARNING The S/5 Compact Monitor, interfacing modules and interfaced devices must be situated in the same patient environment (as defined in IEC 60601-1-1).

WARNING Connecting electrical equipment together or using the same extension cord for more than one device may cause their leakage currents to exceed the limits specified in relevant safety standards. Always make sure that the combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.

4.2.4 Mounting

The DIS module can be mounted on the side panel of the external device. Also IV pole placement is possible.

NOTE: As the Device Interfacing Solution works only with the device specified in the label of the interfacing module, it is recommended that the interfacing module always travels along with the external device.

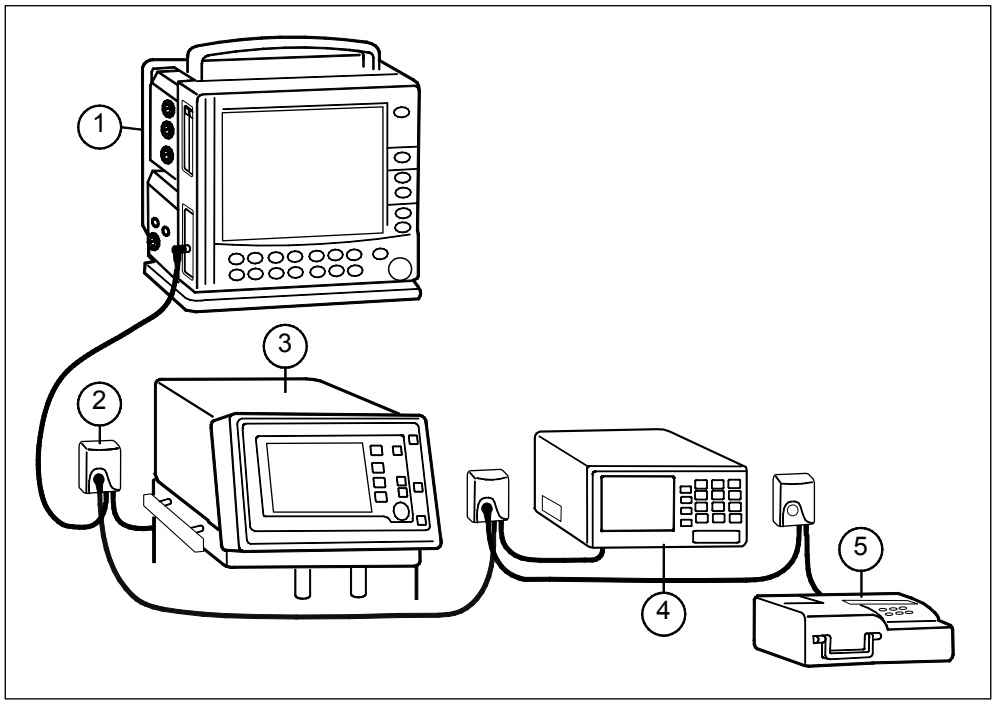


Figure 12 An example of interfacing external devices with Device Interfacing Solution

(1) Datex-Ohmeda S/5 Compact Monitor (with the L-CANE03(A) or L-CICU03(A) software)

(2) Interfacing module (max. 10 pcs)

(3) Monitor

(4) Monitor

(5) Blood gas analyzer

NOTE: You can connect up to ten (10) interfacing modules to one system simultaneously.

CAUTION Make sure that the interfacing module is always used in vertical position to prevent water from entering the module.

CAUTION Make sure that you are connecting the interfacing module to the device specified in the label.

4.2.5 Selecting the external device

1. Connect the interfacing module to the monitor's DIS connector or to another interfacing module.
2. Connect the device specific cable to the external device and turn the external device on.
3. The monitor identifies the connected device automatically.

4.2.6 Selecting the parameter data source

Select the external device via ***Monitor Setup***-/***Interfacing*** – menu:

- Select the desired measurement parameter (e.g., ***Gases***).
- Select the desired source by name (e.g., ***Aestiva***).

NOTE: The name of the device is visible on the list only if the device is correctly connected.

4.3 Interfacing Datex-Ohmeda S/5 Anesthesia Delivery Unit

It is possible to interface the Datex-Ohmeda S/5 Anesthesia Delivery Unit with the S/5 Compact Anesthesia Monitor via the serial interface port. The data link is bi-directional. The parameters transferred to the Anesthesia Delivery Unit are summarized in table 3 and the events transferred to the S/5 Compact Anesthesia Monitor are summarized in table 4. The events are transferred continuously once a minute or during the system check procedure and appear in the trend pages or in the anesthesia record.

4.3.1 Interconnection

Use the ADU-Monitor Cable.

4.3.2 Setting interfacing parameters for the S/5 Anesthesia Delivery Unit

1. Press the **Setup** key.
2. Select ***Install*** password 10.
3. Select ***Interfacing*** and choose S/5 AM.
4. Press the **Normal Screen** key.

4.3.3 Setting interfacing parameters for the S/5 Compact Anesthesia Monitor

No settings are required for the S/5 Compact Anesthesia Monitor.

Table 3 Parameters transferred from S/5 Compact Anesthesia Monitor to S/5 Anesthesia Delivery Unit

Waveforms	Numerics
CO_2	Et & Fi CO_2 % Et & Fi O_2 % O_2% difference (I-E) Et & Fi N_2O% Et & Fi AA% Vol Exp MV Vol Exp TV

Table 4 Events transferred from S/5 Anesthesia Delivery Unit to the S/5 Compact Anesthesia Monitor

Events transferred once a minute	
Ventilator settings	Ventilation (mode) Tidal Volume Minute Volume Resp. Rate I:E Times: inp I:E Times: exp Insp. Pause
Ventilator measurements	Ppeak Pplat Peep Pmin
Fresh gas settings	Agent name Agent % in fresh gas Total flow O_2 flow N_2O flow Air flow
Events transferred during system check	
System check test results	Gas Delivery: Agent Gas Delivery: N_2O Leak Tests: AUTO AUTO Leak (ml/min) Leak Test: MAN MAN Leak (ml/min) Number of confirmed checklist items Bypass Check

4.4 Interfacing Dräger Cicero, Cato, Julian and Narkomed 2C (by NAD)

It is possible to interface Dräger Cicero or Cato to the S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor via the Interface Module, M-INT.

The parameters transferred to the S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor are summarized in tables 5 and 6.

NOTE: Some of the summarized parameters (waveforms or numerics) may not be available in all

device versions.

WARNING **Always make sure that the combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.**

4.4.1 Interconnection

Use the INT-External Device Cable. For Julian and Cicero EM use the INT-Julian/Cicero EM cable.

1. Make sure that the power on both monitors is switched off.
2. Connect the 9 pin D-connector to one of the connectors on the Interface Module, M-INT. Tighten the finger screws.
3. Connect the 25 pin D-connector to the connector X3, X7, X8 or X9 on the interfaced anesthesia machine. The connector is labeled 'RS-232-C'. Tighten the finger screws.

4.4.2 Setting communication parameters

Set the communication parameters for Cicero and Cato to RS-232: 9600, e, 8, 1 (MEDIBUS 3.00). In all cases please refer to the documentation provided by Dräger.

4.4.3 Setting interfacing parameters for the S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor

Set the interfacing parameters for the S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor according the instructions given in the section 4.1.6.

Table 5 Parameters transferred from Dräger Cicero monitor to S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor

Selection	Waveforms	Numerics	States
Gases / SSS	CO_2 (kPa, mmHg, %)	CO_2 Fi & Et (kPa, %) O_2 Fi & Et (%) N_2O Fi & Et (%) RR (CO_2) (1/min) AA Fi & Et (%) Tidal Volume insp. (1) Minute Volume exp. (1) Ppeak (mbar) Pplat (mbar), PEEP (mbar)	None
SpO_2	Pleth (% full scale)	SpO_2 (%) Pulse Rate (1/min)	Probe Off

Table 6 Parameters transferred from Dräger Cato, Julian and Narkomed 2C (NAD) to the S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor

Selection	Waveforms	Numerics	States
Gases / SSS	CO_2 (kPa, mmHg, %)	CO_2 Fi & Et (kPa, %) O_2 Fi & Et(%) N_2O Fi & Et (%) RR (CO_2) (1/min) AA Fi & Et (%) Tidal Volume insp. (1) Minute Volume exp. (1) Ppeak (mbar) Pplat (mbar); not in Narkomed 2C PEEP (mbar)	None
SpO_2	Pleth (% full scale)	SpO_2 (%) Pulse Rate (1/min)	Probe Off

NOTE: The transference of parameters illustrated in tables 5 and 6 represents the maximum. Some of these parameters (waveforms or numerics) may not be available in all device versions.

NOTE: The transference of waveforms requires the MEDIBUS real-time extension and in Dräger Cato waveforms are available only on port 1.

4.5 Interfacing printer

It is possible to interface a laser printer (serial or parallel) with the S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor via the monitors' serial port. The printer should be PCL5 compatible and should contain at least 2MB of memory. Parallel printers require the use of Serial-to-Parallel Converter, order code 78030.

NOTE: The following information on the printers can be used as a reference when obtaining suitable printers locally.

WARNING Always make sure that the combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.

WARNING Connecting the power supply cord of the printer to the wall socket may cause the printer leakage current to exceed the limit specified for medical equipment. Always connect the printer to an appropriate separating transformer.

4.5.1 Setting S/5 Compact Anesthesia Monitor or S/5 Compact Critical Care Monitor interface for printers

1. Press the **Record/Print** key.
2. Select ***Printer Connection***.
3. Select ***Serial***.
4. Press the **Normal Screen** key.

4.5.2 Connection to serial printers

A serial printer is connected to the serial port connector X11 on the frame unit.

Contact your authorized Datex-Ohmeda distributor for advice on suitable serial printers.

4.5.3 Connection to parallel printers

A parallel printer is connected to the serial interface port connector X11 on the frame unit via the Serial-to-Parallel Converter. The converter gets power from the connected devices.

Contact your authorized Datex-Ohmeda distributor for advice on suitable parallel printers.

NOTE: The Serial-to-Parallel Converter, order code 78030 should not be connected to the AS/3 or CS/3 family monitors. The voltage output on the AS/3 and CS/3 monitors' serial port would damage the converter.

Installing the Serial-to-Parallel Converter

Table 7 Parts needed to interface a parallel printer

No	Part	Order No.
1	Common RS-232 serial modem cable	78031
2	Serial to parallel converter	78030
3	DB25 female to female gender changer	78032
4	PC to parallel printer cable	713701

1. Make sure that power is switched off on both devices.
2. Connect a standard PC-to-parallel-printer cable to the parallel printer.
3. Check the DIP-switch settings on the converter :

	Position							
	1	2	3	4	5	6	7	8
Flow Control: hardware	OFF							
LED: Enabled		ON						
Parity/D, Bits/S, Bit: None/8/1			OFF	OFF	OFF			
D.Rate (kbps): 115,2						OFF	ON	OFF

4. Connect a DB25 female-to-female gender changer between the printer cable and converter.
5. Connect a common RS-232 modem cable's DB9 connector to the serial port connector X11 on the monitor, and the DB25 connector to the converter.

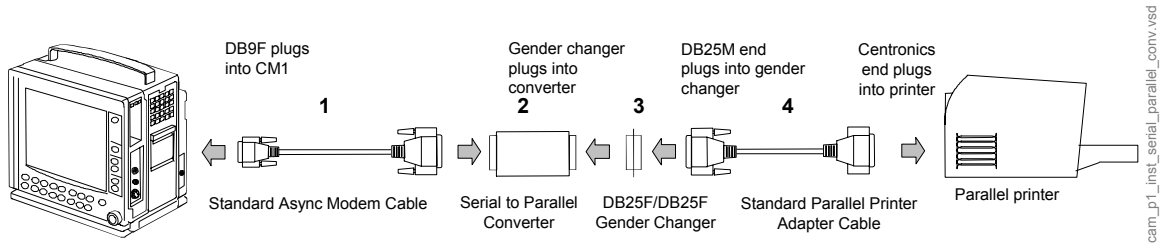


Figure 13 Connection to parallel printer

4.5.4 Connection to Epson EPL-5200 printer

Setting the printing parameters

Set the printing parameters for the EPL-5200 printer according to tables 8 and 9.

Table 8 Printing parameter settings - EPL-5200, SelecType Level 1

Item	Settings
Input	Auto
Page size	A4
Copies	1
Orient.	Port.
Font	RD-0
Status sheet	Choose to print
Font sample	Choose to print
Sub config	
Form Symset	64 lines PcMulti
System	
Full print T-offset L-offset Memory left Load macro Save macro Delete macro Power on macro	20 0 0 Actual value displayed 1 1 1 1

Table 9 Printing parameter settings - EPL-5200, SelecType Level 2

Item	Settings
Feature Print	Choose to print
Emulation	
CH Emulation	S 3/P/Si
Interface	
SLCTIN Autofeed Busy delay Word length Baud rate Parity Stop bit DTR XON/XOFF ENQ/ACK DSR CTS	Off Off 0 ms 8 bit 19 200 bps None 1 On Off Off On On
RX-buffer size	5 kbytes
Uset	Autosense
CH time-out	60
Auto cont.	Off
Lang.	English
Density	L***D
Toner	Actual value displayed
Version	Actual value displayed

Item	Settings
Page counter	Actual value displayed
Ritech	Medium
Standby	Enable

4.5.5 Connection to Epson EPL-5500 printer

By default the printer has only a parallel port, but it is possible to add a serial module with a serial port for the connection. The printer and the serial module (C823341) should be purchased from a local Epson dealer. Also the printer cable should be purchased from a local Epson dealer.

WARNING **Connecting the power supply cord of the printer to the wall socket may cause the printer leakage current to exceed the limit specified for medical equipment. Always connect the printer to an appropriate separating transformer.**

Printer setup

NOTE: For a detailed description, please refer to the documentation provided with the printer.

Serial connection

1. To select the serial mode open the printer cover, remove the side cover, and the shield cover. Check that the jumper switch and the side switches on the serial module are in the serial interface position.

Parallel connection and serial connection

2. Insert the photoconductor unit, and the developer cartridge into the printer.
3. Plug the printer into mains supply, and connect the printer cable.

Serial connection

4. Hold down the button on the control panel, and turn on the printer. Continue to hold down the button until both lights on the control panel turn off, then release the button. Make sure that the green light is flashing, indicating that the printer is in the default setting mode. Input the following code numbers:

Code	Option
124	Set baud rate to 19200
111	Exit the default setting mode

e.g. for 124 push the button on the control panel first once, then twice, and then four times.

Parallel Connection and Serial Connection

Load paper into the paper tray and open the top paper support.

4.6 Interfacing computer

A computer is connected to the serial port connector X11 on the frame unit.

Contact your authorized Datex-Ohmeda distributor for further advice on computer interface.

WARNING **Always make sure that the combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.**

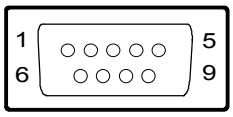
WARNING **Connecting the power supply cord of the computer to the wall socket may cause the computer leakage current to exceed the limit specified for medical equipment. Always connect the computer to an appropriate separating transformer.**

4.7 Output Signals

Analog/ digital output signals on the connectors X4 and X8 can be used for interface with other devices. The pin assignments are illustrated in tables/pictures below.

Coding element connector, X4

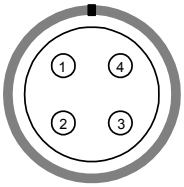
9 pin female D-connector



Pin	Signal
1	IDCS1 (chip select)
2	IDCL (clock)
3	IDDI (data in)
4	IDDO (data out)
5	IDPE (protect enable)
6	+5Vdc
7	Direct ECG
8	Nurse call
9	GND

Synchronization connector, X8

4 pin female connector



Pin	Signal
1	GND
2	Def_Sync
3	Direct ECG
4	Pressure Out

4.7.1 Digital outputs

The digital output signals are as follows:

Defibrillation Sync (X8 pin 2)
The defibrillation sync signal is generated by the ECG. When activated, the signal is set to a high level and then set back to a low level after 10 ms. The signal is regenerated only after returning to the low level. The high level ranges from 2.8 to 5 V while the low level ranges from 0 to 0.8 V. The delay from the R wave peak to the start of the signal is 35 ms maximum.

Nurse Call (X4 pin 8)
The nurse call signal is generated by the red, yellow and white alarms. When activated, the signal is set to the high state and remains at the high state until the alarm situation is over or the SILENCE ALARM key is pressed. The high state range is from 2.8 to 5 V, while the low state range is from 0 to 0.8 V.

If the output signals are used simultaneously with the coding element, the B-UPINET Y-cable, order

number 889308, is recommended.

4.7.2 Analog outputs

Direct ECG (X4 pin 7 and X8 pin3)

Delay (max.): 15 ms
Gain ECG (in)/ECG (out): 1 mV/1V

The signals require input impedance of 100 kΩ

NOTE: The ECG signal is based on the ECG measurement of the Hemodynamic Modules, M-ESTPR (all variations) and M-NE(12)STPR (all variations). The ECG signal from the modules is channel 1 (ECG1). The channels 2 and 3 (ECG2, ECG3) are not transmitted. Make sure that the signal in channel 1 (ECG1) is good enough (extensive QRS for IABP synchronization). For further information, please contact your authorized Datex-Ohmeda distributor.

NOTE: The direct ECG out signal is not available with modules M-ESTP rev. 01, M-EST rev. 00 and M-ETP rev.

Pressure out (X8 pin 4)

P1 from hemodynamic module

The Invasive pressure output signal is 1 V/100 mmHg, originally ranging from 0 to 300 mmHg, and with a delay of approximately 25 ms. The signal requires an input impedance of 100 k.

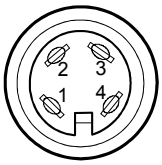
4.8 S/5 Pressure Temp Module, M-PT output signals

The signal output connector on the Pressure Temp Module, M-PT, can be used to interface some models of IABPs to the S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor. The pin assignments are illustrated in table 10. Please contact your local distributor for more information.

WARNING **Always make sure that the combination complies with the international safety standard IEC 60601-1-1 for medical electrical systems and with the requirements of local authorities.**

Table 10 Signal output connector pin assignments

Pin	Signal
1	ECG out, ECG1
2	Pressure out, P3
3	ECG out, ECG1
4	Ground



4.8.1 Analog outputs

The analog output signal specifications are as follows.

ECG (ECG1)
The ECG signal is 1 V/1 mV with a delay of max 15 ms. The signal requires input impedance of 100 kΩ.

NOTE: The ECG signal is based on the ECG measurement of the Hemodynamic Modules, M-ESTPR (all variations) and M-NE(12)STPR (all variations). The ECG signal from the modules is channel 1 (ECG1). The channels 2 and 3 (ECG2, ECG3) are not transmitted. Make sure that the signal in channel 1 (ECG1) is good enough (extensive QRS for IABP synchronization). For further information,

please contact your authorized Datex-Ohmeda distributor.

Invasive Pressure (P3)
The Invasive pressure output signal is 1 V/100 mmHg, originally ranging from 0 to 300 mmHg, and with a delay of approximately 25 ms. The signal requires input impedance of 100 kΩ.

5 FUNCTIONAL CHECK

These instructions include procedures for a functional check for Datex-Ohmeda S/5 Compact Anesthesia Monitor and S/5 Compact Critical Care Monitor. The functional check is recommend to be performed after monitor installation.

These instructions include a Check Form (APPENDIX A) to be filled in when performing the corresponding procedures. The symbol in the instructions means that the performed procedure should be signed in the check form. The procedures should be performed in ascending order, by passing those that are not applicable for a particular monitor.

All menu selections related to Datex-Ohmeda products are written in following typeface:
e.g. ***Parameters -More...-TONO***

As you enter the service menus, you need following passwords:

Monitor Setup -*Install/Service* (password 16-4-34)-***Service*** (password 26-23-8)

In case you evaluate the measurement accuracy with a patient simulator, add simulator 's accuracy specification to the one of the monitor.

5.1 Recommended tools

Tool	Order No.	For product(s)
Sampling line 2 m	73318	Compact Airway Modules
Spirometry tube 2 m	890031	Compact Airway modules w/(V)
D-lite	733950	Compact Airway modules w/(V)
Patient simulator		Hemodynamic modules
SpO2 finger probe	OXY-F4-N or SAS-F4	Hemodynamic modules w/(S)
OxyTip ® + Reusable Finger Sensor Integrated Finger Sensor	OXY-F4-N	Hemodynamic modules w/(S)
Adult NIBP cuff	572428	Hemodynamic modules w/(NIBP)
Adult NIBP hose	877235	Hemodynamic modules w/(NIBP)
Earphones	80010000	EEG Module, M-EEG
Nellcor SpO2 sensor		M-NSAT
MemCard – Data	887044	Monitor w/ MemCard Option
Screwdriver		All
Simulator for M-ENTROPY	N-ES	M-ENTROPY
Entropy sensor cable		M-ENTROPY

5.2 Visual inspection

Make sure that the monitor is switched to standby.
Disconnect the mains power cord from the frame unit.
If the monitor is connected onto S/5 Network with a Mon-Net cable, disconnect the cable from the frame unit. Leave the WLAN antenna card connected, if the Wireless LAN option is installed.
Remove any memory cards, if connected.

1. Check all units visually:
   - all parts are intact
   - all screws are tightened properly
   - the display unit locking screw is in a locking position
   - modules go in smoothly and lock up properly in all module slots
   - a sampling line is connected to a Compact Airway Module, if installed

CAUTION Ensure that the module is properly orientated (i.e. module release latch facing downward) before insertion.

5.3 Functional inspection

5.3.1 General

1. Connect the mains power cord to the frame unit.
   Check that the LED above the main switch is lit continuously (full charged batteries) or periodically (charging batteries).
2. Switch the monitor on.
   Check that the monitor starts up properly, i.e. the alarm LEDs and the display unit fan turn on shortly, normal start-upsound is heard from the loudspeaker and monitoring screen appears. No error messages should appear onto the screen.
3. Enter the service menu.
   Check that the 'Timeouts ', 'Bad checksums ' and 'Bad c-s by mod ' values of installed modules are not increasing faster than by 5 per second. Check also that the modules' memories have passed the internal memory test, i.e.'RAM ', 'ROM ' and 'EEPROM ' all state OK. If the recorder unit is installed, the unit should record two lines of start-up information.

   Preset measurement settings for those parameters that are connected are, for example:

   Recorder -Record Waveforms -Waveform 1 -ECG1
   -Waveform 2 -P1
   -Waveform 3 -P2

   Invasive Pressures -P1 'ART ' Setup --Label –ART
   -P2 'CVP ' Setup --Label –CVP
   -P3 Setup -Label –PA
   -P4 Setup -Label -P4
   -P5 Setup -Label -P5
   -P6 Setup -Label -P6

   Pulse Oximetry -Pleth Scale –AUTO
   or

Others -SPO2 Setup -Pleth Scale –AUTO

Airway Gas -Spirometry View -Scaling -Indep.
-Paw Scale –20
-Flow Scale –15
or
Ventil.-Spirometry Setup -Scaling -Indep .
-Paw Scale –20
-Flow Scale –15

Others -Resp Setup -Size -1.0
-Resp Rate Source –AUTO
-Measurement –ON
-Detection Limit –AUTO

5.3.2 Display

1. Check that the picture on the screen is adjusted properly.

5.3.3 Keyboard(s)

1. Tests with all connected keyboards:
   Press the **Help** key. Turn the ComWheel in both directions and check that the cursor in the menu moves correspondingly. Highlight **Normal Screen**, press the ComWheel and check that the menu disappears from the screen.

5.3.4 Display unit

1. Check that the clock on the screen shows correct time.
   Readjust the time and date, if necessary.

5.3.5 Frame Unit

1. Check that the frame unit fan is running.

5.3.6 Recorder Unit

1. Press the **Record Wave** key and check that the module starts recording the selected waveforms. Press the **Stop** key on the module to stop recording.

2. Check that the quality of the recording is acceptable.

5.3.7 Network and MemCard Option

1. Insert Data card .

Check that the corresponding icon appears onto the monitor screen.

5.3.8 Network Option

1. Check that the Mon-Net cable connector and the Identification plug are clean and intact, then connect them to the frame unit.
   Check that the monitor connects onto the S/5 Network, i.e. the network symbol appears on the upper right-hand corner of the screen.

5.3.9 Wireless LAN Option

1. Check that the green LED on the wireless antenna card blinks and the WLAN signal strength symbol roams or stays fixed on the monitor screen.
2. Check that the monitor connects onto the S/5 Network, i.e. the wireless LAN network symbol appears on the upper right-hand corner of the screen.

NOTE: If the monitor does not connect onto the S/5 network, check the WLAN configuration on the monitor and on the network.

5.3.10 Compact Airway Module, M-CXXXXX

Wait until the message ‘Calibrating gas sensor ’ disappears from the screen.

1. Check that the fan is running.
2. If the module contains membrane keys on the front panel, press each of the keys for at least one second and check that they are identified.

Compact Airway Modules w/the Patient Spirometry option

3. Connect a clean spirometry tube and D-lite to the module. Connect the sampling line. Breathe through the wider side of the D-lite. Check that the flow waveform moves downwards when you breathe in and upwards when you breathe out.

For all Compact Airway Modules

4. Block the tip of the sampling line with your finger and check that the message ‘Sample line blocked ’ appears on the monitor screen within 30 seconds.
5. Detach the D-fend and check that the messages ‘Check D-fend ’ appears on the monitor screen within 30 seconds.
6. Breathe to the sampling line briefly. Check that the CO2 information is updated on the screen.

5.3.11 Single width Airway Module, M-miniC

Wait until the message 'Calibrating gas sensor' disappears from the screen.

1. Block the tip of the sampling line with your finger and check that the message 'Sample line blocked' appears on the monitor screen within 30 seconds.
2. Detach the Mini-D-fend and check that the message 'Check D-fend' appears on the monitor screen within 30 seconds.
3. Breathe to the sampling line briefly. Check that the CO2 information is updated on the screen.

5.3.12 Tonometry Module, M-TONO

1. Press each of the front panel membrane keys for at least one second and check that they are identified.

5.3.13 Hemodynamic Modules

ECG and RESP measurements

1. Check functioning of the front panel membrane key ECG LEAD, if available.
2. Connect an ECG cable to the module. Connect the cable leads to a patient simulator. Check that all ECG and impedance respiration information is shown on the monitor screen as configured on the simulator.
   Turn the simulator off. Check that the ‘Asystole ’ and ‘Apnea’ messages are displayed.

Modules w/temperature measurement

3. Check the temperature channels with a patient simulator.
   Check that temperature measurement information is shown on the monitor screen as configured on the simulator.

Modules w/invasive blood pressure measurement

4. Check functioning of the front panel membrane keys.
5. Check the InvBP channels with a patient simulator.
   Zero the InvBP channels, the check that the values and waveforms correspond to the simulator settings.

Modules w/SpO2 measurement

6. Connect SpO2 finger sensor to the module. Check that the message ‘Probe off ’ is show when the sensor is not connected to a finger.
7. Attach the SpO2 sensor to your finger. Check that a reading of 95-99 and a Pleth waveform appear onto the screen

Modules w/non invasive blood pressure measurement

8. Check functioning the front panel membrane keys.
9. Attach an adult NIBP cuff onto your arm and perform one NIBP measurement. Check the module identifies the cuff, i.e. the text 'Adult ' appears in the NIBP digit field for a short time. Check that the module gives a reasonable measurement result.

5.3.14 Pressure/Pressure Temp Modules, M-P/-PT

Invasive blood pressure measurement

1. Check the functioning of the front panel **Zero P3** membrane key.
2. Check the InvBP channel with a patient simulator.
   Zero the InvBP channel. Then check that the values and waveforms correspond to the simulator settings.

Modules w/temperature measurement

3. Check the temperature channels with a patient simulator.
   Check that temperature measurement information is shown on the monitor screen as configured on the simulator.

5.3.15 Dual pressure Module, M-PP

1. Check the functioning of the front panel **Zero P5** and **Zero P6** membrane keys.
2. Check the InvBP channels with a patient simulator.
   Zero the InvBP channels. The check that the values and waveforms correspond to the simulator settings.

5.3.16 Cardiac Output Modules, M-COP/-COPSv

Invasive blood pressure measurement

1. Check the functioning of the front panel membrane **Zero P4** key.
2. Check the InvBP channel with a patient simulator.
   Zero the InvBP channel. Then check that the values and waveforms correspond to the simulator settings.

Cardiac Output measurement

3. Check the functioning of the front panel **Start C.O.** membrane key.

5.3.17 NIBP module, M-NIBP

1. Check the functioning of the front panel membrane keys.

2. Attach an adult NIBP cuff onto your arm and perform one NIBP measurement.
Check the module identifies the cuff, i.e. the text ‘Adult ’ appears on the NIBP digit field for a short time.
Check that the module gives a reasonable measurement result.

5.3.18 Nellcor Compatible Saturation module, M-NSAT

1. Connect a Nellcor SpO2 finger sensor to the module. Check that the message ‘Pulse search ’ is shown. Check also that the shown message changes to ‘Check probe ’ within 30 seconds.
2. Attach the SpO2 sensor on your finger. Check that a reading of 95-100 and a proper SpO2 waveform appear.

5.3.19 Datex-Ohmeda Oxygen Saturation module, M-OSAT

1. Connect a Datex-Ohmeda OxyLead Cable compatible sensor ot Integrated sensor to the module. Check that the message ‘Pulse search ’ is shown. Check also that the shown message changes to ‘Check probe ’ within 30 seconds.
2. Attach the SpO2 sensor on your finger. Check that a reading of 95-100 and a proper SpO2 waveform appear.

5.3.20 EEG Module, M-EEG

1. Check that the EEG module is recognized by disconnecting it shortly.

5.3.21 BIS-Module, M-BIS

1. Connect the BIS module to the monitor frame.
Check that 'Cable off' is displayed in the BIS waveform field.
2. Connect the DSC to the module.
Check that 'No sensor' message appears to the waveform field.
3. Check the functioning of the front panel membrane keys.
Pressing **BIS** key should open BIS Setup page. Check that 'Test DSC' shows PASS.

NOTE If sensor is not connected, the Check Sensor key is inoperative.

5.3.22 Entropy Module, M-ENTROPY

1. Check the function of the front panel membrane keys.
2. Connect the Entropy sensor cable and Entropy simulator to the module. See that “Checking sensor” text and image appear to the waveform numeric field. Wait for a while and check that all sensors show “PASS” .
3. Check that the EntrEEG waveform and RE and SE values appear on the monitor screen.

5.3.23 Interface Board/Module, B-INT/M-INT

1. Make sure that the monitor receives all necessary parameter data from the connected devices. Check the screen configuration and the related interfacing settings, if necessary.

   Monitor Setup – ***Interfacing***

5.3.24 Device Interfacing Solution, N-DISxxx

1. Make sure that the monitor receives all necessary parameter data from the connected devices. Check the screen configuration and the related interfacing settings, if necessary.

   Monitor Setup - ***Interfacing - Staus Page***

5.3.25 General

1. Perform an Electrical safety check and a leakage current test.
   Check that the monitor and all connected units function normally after the performed test

2. Switch the monitor to standby and perform final cleaning.
   Fill in all necessary documents.

6 GENERAL TROUBLESHOOTING

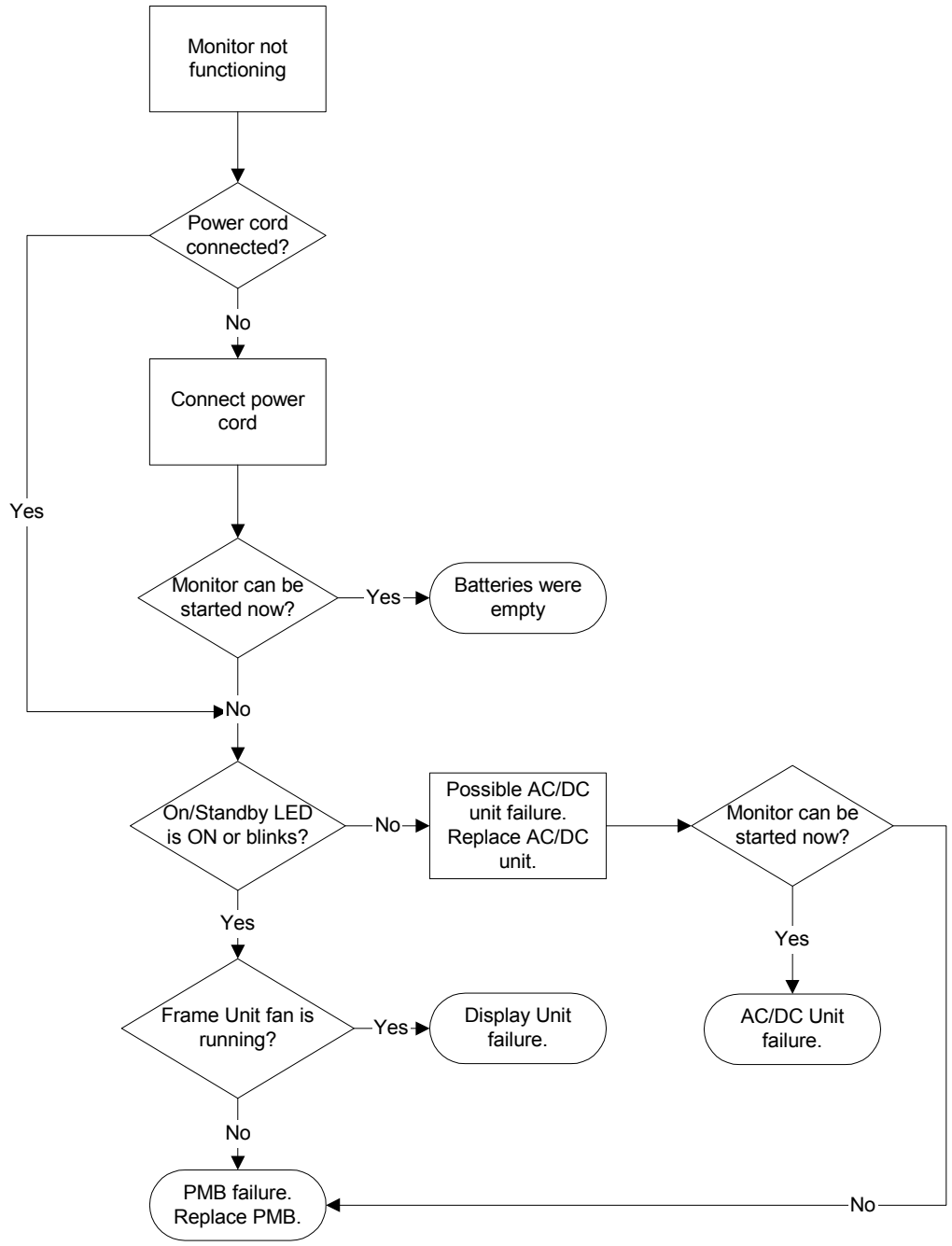


Figure 14 Monitor General Troubleshooting Flowchart

APPENDICES A, B

FUNCTIONAL CHECK FORM

S/5 Compact Anesthesia Monitor
S/5 Compact Critical Care Monitor

Customer					
Service		Monitor type		S/N	
Service engineer				Date	

Monitor Installation

F-		M-					
S-		M-					
M-		M-					

☐ OK = Test OK ☐ N.A. = Test not applicable ☐ Fail = Test Failed

Visual inspection

	OK	N.A.	Fail
5.2. Visual inspection	☐	☐	☐

Functional inspection

		OK	N.A.	Fail
5.3.1. General		☐	☐	☐
5.3.2. Display		☐	☐	☐
5.3.3. Keyboard(s)	S/N	☐	☐	☐
5.3.4. Display unit		☐	☐	☐
5.3.5. Frame Unit		☐	☐	☐
5.3.6. Recorder Unit		☐	☐	☐
5.3.7. Network and MemCard Option		☐	☐	☐
5.3.8. Network Option		☐	☐	☐
5.3.9. Wireless LAN Option		☐	☐	☐

Notes

		OK	N.A.	Fail
5.3.10. Compact Airway Module	S/N	☐	☐	☐
Compact Airway modules w/ Spirometry option		☐	☐	☐
For all Compact Airway modules		☐	☐	☐
5.3.11. Single width Airway Module, M-miniC	S/N	☐	☐	☐

Notes _____

5.3.12. Tonometry Module, M-TONO	S/N	☐	☐	☐

Notes _____

5.3.13. Hemodynamic Modules, M-NE12STPR etc.	S/N	☐	☐	☐
ECG and RESP measurement		☐	☐	☐
TEMP measurement		☐	☐	☐
InvBP measurement		☐	☐	☐
SpO_2 measurement		☐	☐	☐
NIBP measurement		☐	☐	☐

Notes _____

5.3.17. Pressure/Pressure Temp Modules, M-P/-PT	S/N	☐	☐	☐
InvBP measurement		☐	☐	☐
TEMP measurement		☐	☐	☐

Notes _____

		OK	N.A.	Fail
5.3.18. Dual pressure Module, M-PP	S/N	☐	☐	☐

Notes _____

		OK	N.A.	Fail
5.3.19. Cardiac Output Modules, M-COP/-COPSv.	S/N	☐	☐	☐
InvBP measurement		☐	☐	☐
C.O. measurement		☐	☐	☐

Notes _____

5.3.20. NIBP module, M-NIBP	S/N	☐	☐	☐
5.3.21. Nellcor Compatible Saturation module, M-NSAT	S/N	☐	☐	☐
5.3.22. Datex-Ohmeda Oxygen Saturation module, M-OSAT	S/N	☐	☐	☐

Notes _____

5.3.23. EEG Module, M-EEG	S/N	☐	☐	☐
5.3.24 Interface Board/Module, B-INT/M-INT	S/N	☐	☐	☐
5.3.25. BIS-Module, M-BIS	S/N	☐	☐	☐
5.3.26. Entropy Module, M-ENTROPY	S/N	☐	☐	☐

Notes _____

5.3.23. Interface Board/Module, B-INT/M-INT	S/N
5.3.24. Device Interfacing Solution, N-DISxxx	S/N
	S/N

Notes

	OK	N.A.	Fail
5.3.25. General	☐	☐	☐
Electrical safety test and leakage current test	☐	☐	☐

Notes

Used Spare Parts

Signature

APPENDIX B

ELECTROMAGNETIC COMPATIBILITY

Table 1 Guidance and manufacturer's declaration – electromagnetic emissions

Guidance and manufacturer's declaration – electromagnetic emissions		
The S/5™ CM (1 is intended for use in the electromagnetic environment specified below. The customer or the user of the S/5™ CM (1 should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The S/5™ CM (1 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The S/5™ CM (1 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

(1 S/5™ CM equipped with M-NESTPR or M-NE12STPR, M-ENTROPY, M-BIS, M-MINIC and N-DIS.

Table 2 Guidance and manufacturer's declaration – electromagnetic immunity

Guidance and manufacturer's declaration – electromagnetic immunity			
The S/5™ CM [1] is intended for use in the electromagnetic environment specified below. The customer or the user of the S/5™ CM [1] should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transients/bursts IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply lines IEC 61000-4-11	<5 % UT (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	<5 % UT (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If user of the S/5™ CM (1 requires continued operation during power mains interruptions, it is recommended that the S/5™ CM (1 be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic field should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. mains voltage prior to application of the test level.			

[1] S/5™ CM equipped with M-NESTPR or M-NE12STPR, M-ENTROPY, M-BIS, M-MINIC and N-DIS.

Table 3 Guidance and manufacturer's declaration – electromagnetic immunity

Guidance and manufacturer's declaration – electromagnetic immunity			
The S/5™ CM [1] is intended for use in the electromagnetic environment specified below. The customer or the user of the S/5™ CM [1] should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the S/5™ CM [1], including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz
	3 V/m 80 MHz to 2.5 GHz	1 V/m [2]	$d = 3.5\sqrt{P}$ 80 MHz to 800 MHz $d = 7.0\sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol:
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicated theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the S/5™ CM [(1] is used exceeds the applicable RF compliance level above, the S/5™ CM [(1] should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting of relocating the S/5™ CM [(1] .

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m .

[(1] S/5™ CM equipped with M-NESTPR or M-NE12STPR, M-ENTROPY, M-BIS, M-MINIC and N-DIS.

[(2] For M-BIS.

Table 4 Recommended separation distances between portable and mobile RF communications equipment and the S/5™ CM (1

Recommended separation distances between portable and mobile RF communications equipment and the S/5™ CM (1 .			
The S/5™ CM (1 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the S/5™ CM (1 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the S/5™ CM (1 as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter** m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$ $d = 3.5\sqrt{P}$ (2	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$ $d = 7.0\sqrt{P}$ (2
0.01	0.12	0.12 0.35 (2	0.23 0.70 (2
0.1	0.38	0.38 1.1 (2	0.73 2.2 (2
1	1.2	1.2 3.5 (2	2.3 7.0 (2
10	3.8	3.8 11 (2	7.3 22 (2
100	12	12 35 (2	23 70 (2
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

(1 S/5™ CM equipped with M-NESTPR or M-NE12STPR, M-ENTROPY, M-BIS, M-MINIC and N-DIS.

(2 For M-BIS.